Implicit Cognitions in Awareness: Three Empirical Examples and Implications for Conscious Identity

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Abstract

Across psychological science the prevailing view of mental events includes unconscious mental representations that result from a separate implicit system outside of awareness. Recently, scientific interest in consciousness of self and the wide-spread application of mindfulness practice have made necessary innovative methods of assessing awareness during cognitive tasks and validating those assessments wherever they are researched. Studies from three areas of psychology, self-esteem, sustainability thinking, and the learning of control systems questioned the unconscious status of implicit cognitions. The studies replicated published results using methods of investigating (a) unselective learning of a control task (b) implicit attitudes using IAT, and (c) the Name-letter effect. In addition, a common analytic method of awareness assessment and its validation was used. Study 1 demonstrated that learned control of a dynamic system was predicted by the validity of rules of control in awareness. In Study 2, verbal reports of hesitations and trial difficulty predicted IAT scores for 34 participants' environmental attitudes. In Study 3, the famous Name-letter effect was predicted by the validity of university students' reported awareness of letter preference reasons. The repeated finding that self-knowledge in awareness predicted what should be cognitions outside of awareness, according to the dual processing view, suggests an alternative model of implicit mental events in which associative relations evoke conscious symbolic representations. The analytic method of validating phenomenal reports will be discussed along with its potential contribution to research involving implicit cognitions.

Keywords: consciousness, implicit attitudes; implicit learning; implicit self-esteem

Introduction

What thoughts are conscious and what are not? This question is fundamental to the meta-theoretical frameworks within which we understand mental events in psychology. The durability of the question is well illustrated by contrasting Freud's 1915 statement (translated, 1963) regarding his cornerstone unconscious, "We become obliged then to take up the position that it is both untenable and presumptuous to claim that whatever goes on in the mind must be known to consciousness" (p. 117) with William James' early mentalistic approach: "The unconscious is the sovereign means of believing whatever one likes in psychology and of turning what might become a science into a tumbling ground for whimsies." (James, 1890, p. 163). Since that time, and apparently long before (Wilson, 2016), psychology's posture has been to conflate ontological concerns of mind with an empirical science of consciousness, what explains it, and what it explains (Dulany, 2014). As a consequence, what is conscious has been largely ignored in today's theoretical networks as a slow, serial, resource-depleting part of the mind (Evans, 2008) that is an occasional "emergent" (Jackendoff, 1987) delayed in time with brain functioning (Libet, 1985).

In contrast, what is *not* conscious has dominated psychological theory to the present day. The standard dual-processing approach posits separate conscious (explicit) and unconscious (implicit) systems, or a divided self (e.g., Beattie, 2010), with a fast, automatic, and parallel processing implicit system. Under this view most cognitive operations really take place in the implicit unconscious system (Kihlstrom, 1987) where unconscious memories, implicit associations forming social attitudes, unconscious self-knowledge, rules for judgment and motor control, complex inferences, and temporary priming all explain a range of phenomena that apparently defy conscious explanation (e.g., Berry & Broadbent, 1988; Holender, 1986; Kihlstrom, 1999; Lewicki, 1986). In other words, there are mental representations of which we are unaware and unconscious cognitions that influence our thoughts and behaviors outside of our awareness (e.g., Dienes & Altmann, 1997; Grecco, Robbins, Bartoli, & Wolff, 2013; Mealor, Dienes, & Scott, 2014). Evans (2008) summarized the distinction: "All these theories have in common the distinction between cognitive processes that are fast, automatic, and unconscious and those that are slow, deliberative, and conscious." (p. 255). Thus, for decades the metatheoretical climate of psychology has remained resistant to an agentive and explanatory cognitive conscious and instead has accepted that there are "covariations [that] can be detected, processed, and stored (i.e., acquired) without mediation of conscious awareness" (Lewicki, 1986, p. 29).

Recent practical interest in mindfulness has produced an increasing research focus on consciousness (e.g., Newell & Shanks, 2014; Wilson & Smith, 2017) and fostering self-awareness and its application (e.g., Bruin, van der Zwan, & Bögels, 2016; Kataria & Regner, 2015), of which only a simple review of most recent work is mentioned here. For example, theoretical models of individual awareness of self-related knowledge have been critically tested for associative access in the laboratory (e.g., Stein, Siebold, & van Zoest, 2016). In addition, measures of self-awareness in children have been created for clinical developmental research (Geurten, Catale, Geurten, Wansard, & Muelemans, 2016). Empirical examination of mindful attention (Keith, Blackwood, Mathew, & Lecci, 2016) has found strong relationships between

self-reported mindfulness levels and attention disorders, concentration, and mind-wandering. Furthermore, a recent increase in evidence-based mindfulness practice is clearly demonstrated by digital analysis: the term "mindfulness" was more frequently used in high-impact clinical psychology journal articles' titles and abstracts than the term "unconscious" in recent years (Wilson, Hefferman, & McMahon, 2015). Nevertheless, to advance the empirical study of human awareness against the background of a marginalized consciousness in cognitive theory, innovative methods of awareness assessment and validation are required. And rather than ask participants to play theorists about their own minds when answering post-experimental questions, an analytic approach to consciousness assessment is required that considers the forms of conscious contents that may be in awareness. Fortunately, approaches have emerged to test empirical statements about conscious cognitions (e.g., Baumeister & Masicampo, 2010; Carlson, 2002; Perruchet & Vintner, 2002; Shanks et al., 2013) that emphasize the relevance and reliability of immediate conscious reports (Newell & Shanks, 2014).

What follows first is a brief description of an alternative conceptualization to the standard dual-process metatheory. A summary is then presented of empirical evidence from three studies across psychological domains that replicate a common analytic approach to awareness assessment and validation. In each case introspective access to task-related knowledge in awareness was achieved and the validity of conscious reports predicted the experimental task results. In all three cases individuals were surprisingly aware of knowledge that the standard view hypothesizes to be implicit and outside of awareness.

An Alternative to the Standard Dual-Process Approach

Let's begin to challenge the long-standing computational dual-process view of human cognition using the visual metaphor of a three-layer cake. In the top layer are found all *explicit* cognitions that are *conscious.* These may be conscious states and contents in awareness that result from introspective attention, deliberative thinking, and hypothesis testing. Conscious cognition often produces knowledge that guides our plans and actions after some form of deliberation that takes attentional effort over a series of mental events. In the bottom layer of the cake are the underlying physical processes of the brain that underlay, give rise to, and correlate with, those conscious states and contents (Churchland, 2006). Note, therefore, that the bottom layer entails the analysis of physical systems rather than mental. Now consider, according to the standard dual-process metatheory, in between the conscious top and physiological bottom layers there exists a middle layer of mental representation in which are found *implicit* cognitions that are *unconscious*. These may be thoughts and recognitions outside of awareness that are abstracted from the covariations we experience (e.g., pairings, repetitive motor sequences, rules of input-output, grammars, event sequences). The middle layer of the metaphorical cake is particularly delicious because, according to the standard view, this is the system where implicit cognitions influence our behavior and we are quite unaware of it (Kihlstrom, 1999). It is the sub-personal mental system that produces "tacit knowledge" that cannot be articulated (Lewicki, Hill, & Bizot, 1988) but nevertheless guides much of our judgments and actions (e.g., Dienes & Altmann, 1997; Greenwald & Banaji, 1995; Reber, 1967).

Now, think for a moment of something that has happened in the last days that you attribute to your unconscious mind. Give it some time to come to you; think of something you would say happened unconsciously. For example, you may have wondered whether or how you locked that door or replaced the car's gas cap because you don't remember doing it. Or you may have been troubled by things in your day that you had not recognized until you poorly slept and dreams reflected these anxieties. Perhaps you left thinking on a problem for later only to have the solution pop into your mind when you did not expect it. The unconscious clearly explains how many mental episodes like these could happen without your awareness, but what is an alternative explanation for these unconscious influences on behavior? That is, do we really associate, abstract, search, and store unconscious symbolic representations such as a control algorithm we've learned (Hayes & Broadbent, 1988) or our implicit sub-personal self-esteem (Nuttin, 1985) of which we are unaware? Really? Ask yourself what is another way to understand your example of the unconscious. Could what happened be potentially described as taking place at a neurobiological level? Could the cognitive processing, rather than dropping down to a symbolic level "below" your awareness, drop out altogether from an analysis of mental representation?

Consider a cognitive architecture that effectively takes out the middle layer of the three-layer cake. An alternative "mentalistic" approach to cognition (Carlson & Dulany, 1988; Dulany, 2003; Dulany & Wilson, 1990) eliminates the postulate of an unconscious mental representation within an implicit system. In essence it says for psychological events there is a mental level of description and a physical level of description. In this approach, the distinction of what is conscious (explicit) and what is not (implicit) is determined not by separate mental systems but rather by two forms of conscious contents and the *non-conscious* interrelations that may be shown to empirically link them (Dulany, 1991). The mentalistic metatheory of cognition posits (a) that all symbolic mental representation is conscious and (b) that these representations can be either propositional (awareness *that* "this is X") or sub-propositional (awareness *of* "X") forms of mental events. The subjects and predicates of propositional contents are symbolic representations in consciousness, such as "Psychology + can be fascinating," and "This + is a book." By functional specification, these symbols may evoke other symbols, or contents, in awareness (e.g., Brighton *evokes* Conference) and related conscious associations. Propositional representations possess the feature of recursion in that the predicate of a proposition also can be a proposition in awareness. Sub-propositional contents are immediately evoked symbolic representations in awareness, such as the recognition of "heat" or "dim" before or after other evoked conscious representations interrelated with "heat" or "dim" whether they be thoughts to act, episodic memories, specific imagery, etc. Another example is awareness of any "perceptual pattern" normally accompanied with phenomenal (personal) awareness, also a conscious content if evoked, that immediately leads to the former kind, propositional representations, as a variety of running conscious contents (e.g., awareness *that* "I am aware" *that* "this is a book").

Without a separate implicit system, it is reasonable to assume that unconscious priming, implicit self and social attitudes, control algorithms, and other cognitions shown to be outside of awareness are, ultimately, the result of non-conscious operations. They are non-conscious in the sense of not existing within the set of objects of human awareness. For example, if the non-conscious functions outside of awareness are patterns of brain processes, such as neural networks that embody

presently inactive memories or biased social attitudes, then such physical events cannot be contents of conscious awareness (Dulany, 2014). At this point the interesting question becomes: To what sorts of contents might individuals have conscious access? The mentalistic approach to cognition addresses the question of what is conscious and what is not by recognizing two forms of conscious contents. These mental representations are the symbols by which we represent our cognitions to ourselves and they function within two types of mental events, either associative or deliberative. Associative cognitions involve sub-propositional contents in awareness, often fleeting, that evoke and are evoked by associative activation (e.g., one thought runs to another, a smell evokes a conscious memory or a feeling of comfort). Deliberative mental events are those conscious cognitive actions regarding propositional contents in awareness (e.g., Brighton is by the sea, Shall I shop in Brighton?) that constitute much of our conscious life.

So, then, what sort of empirical evidence would support the view that there is no need for the middle layer, i.e., an explanatory cognitive unconscious in a separate implicit mental system? Would it involve an analytic approach to conscious access within unconscious mental episodes? That is, it seems reasonable to confirm that the conscious top layer is where the symbolic representation happens. And would supporting evidence include the predictability of those conscious contents for the phenomena under investigation? Such evidence would eliminate the need for an unconscious explanation. The following three studies in automatic control learning, environmental attitudes, and implicit self-esteem took the same general analytic approach to assessing conscious awareness and predicting the phenomenon under examination.

An analytic approach to conscious awareness: Three examples

The first example was a replication study performed with Don Dulany (Dulany & Wilson, 1990) of the "person in the computer" paradigm used by Hayes and Broadbent (1988) to research dynamic systems control learning in either conscious and unconscious learning modes. Participants interacted with the computer by simple input-feedback exchanges with a computer along 12 levels of warmth including Very Rude, Cool, Indifferent, Friendly, and Loving. The learning objective was to keep the computer person responding in range of the level of Friendly. The computer's programming made its reply to the participant's input a few steps away from the level input, with a plus or minus 1 random element. In the unconscious learning condition the computer's reply was to the input minus 1 trial, a feature of the algorithm participants could not articulate and yet they learned to control the computer all the same. To be sure, participants showed some procedural awareness of the task, but at the time the selective impairment of learning in the explicit, or "figure it out," mode by a secondary resource-depleting task was widely cited as evidence for learning to control the computer without awareness. Soon thereafter, an attempt to replicate the evidence for superiority of the implicit learning in this task failed (Green & Shanks, 1993); however, whether learning to control a simple computer algorithm is more successful in either mode, these studies begged the fundamental question of unconscious mental representation with a non-analytic approach to consciousness.

Our replication provided insights into the status of the symbolic representations that are learned and used in performing the control task. In this case our analysis involved

interrupting the participants before the last block of 10 trials (of 30 or 50) to collect either retrospective or prospective reports regarding the levels of input that were or could be used to keep the computer on target. Using this constrained, task-related conscious report made possible the quantification each report's validity against those inputs that did constitute control by algorithm. That is, we created a metric of *how well the participants' conscious awareness reflected correct knowledge of the system.* As in the Hayes and Broadbent (1988) methodology our experimental conditions were manipulated by 0 and -1 trial algorithm and either with or without a challenging secondary task of random digit generation. Learning was found for both modes but the interaction with the secondary task did not replicate; there were equally fewer inputs on target in either learning mode when also performing a resource-depleting task.

What was of interest was participants' conscious awareness of what to do in the task. Remarkably, the validities of the reported rules equally predicted performance in all conditions, and without a statistically reliable under-prediction. To best understand the mental events involved, a model of deliberative strategy was developed and fitted performance on the task with increasing accuracy over learning trials and in all conditions. These findings indicated that learning the computer person task involves both deliberative and associative mental episodes with consciousness controlling inputs in both. When participants were deliberatively error-correcting their inputs and when they were responding to input-output learned associations, they were aware of these products—they had introspective access to them. In conclusion, there was no evidence for mental representation of the learned algorithm, or the rules by which inputs connected computer replies, at an unconscious level. Furthermore, the analytic technique for conscious access proved effective for demonstrating participants were aware of what they learned and all symbolic mental representations required to explain performance of the computer control task were conscious.

The second example is a recent study reported by Wilson and Smith (2017) examining the unconscious status of implicit attitudes toward the environment. Research has shown that the common incongruity between what people say about global sustainability and what they do about the environment can be explained by the influence of implicit environmental attitudes (Beattie & McGuire, 2015). Like other forms of implicit associations (Greenwald & Banaji, 1995), the standard dual-processing metatheory understands the incongruity as the result of a separate implicit mental system that is capable of affecting behaviour outside of awareness. Thus, what one knows is socially acceptable to say is consciously entertained and stated; the implicit system betrays one's unrelated implicit attitude when measured by D-score on the implicit association test (IAT). Our study examined the operational adequacy of the commonly used IAT technique by directly asking participants to report their recognition of behavioral influences while they performed an IAT for environmental attitudes.

Our replication of the environmental IAT research involved interrupting the participants randomly between 3 and 5 times during the test for a conscious report. Again we asked for constrained task-related knowledge to which we might find conscious access, rather than asking for general awareness of the experimental conditions or hypothesis, thereby improving on the non-analytic consciousness questioning reported across the implicit cognition literature (see Dulany 2003). In this

case we asked participants to indicate on a 5-point scale the difficulty of the last trial and to estimate how many trials of the last 10 were hesitations. These reports made possible the quantification of validity against the trial-by-trial record, the configuration of the stimuli and the response latency recorded. That is, we created a metric of *how well the participants' conscious awareness reflected recognition of their own response bias.* Results revealed the IAT method to be inadequate as a measure of environmental attitudes that are implicit. We found participants were very aware of their IAT response latencies and accurately recognised IAT features that produced those latencies. The validity. Furthermore, the validity of trial difficulty in awareness predicted the IAT D-scores, challenging the claim to attitude effects of which individuals are unaware. In conclusion, there was no evidence for mental representation of environmental attitudes, whether biased or not, at an unconscious level. Furthermore, the analytic technique for conscious access proved effective for demonstrating participants were aware of the trials with difficulty and sufficient symbolic mental representations to explain performance of the environmental IAT were conscious.

The third and final example was a test of operational adequacy of the name-letter effect as a measure of implicit self-esteem (Boatright-Horowitz, 1995; Nuttin, 1985). Current theory regarding self-esteem follows the standard metatheory as well and in this case it questions how well individuals know themselves and their own identity. The name-letter effect is the well-known and ubiquitous finding that people like the letters in the own name more than other letters, they give name-letters higher average preference ratings and, when tested in a particular fashion, individuals remain unaware that there was any difference by name-letter or experimental Gestalt. The effect has been often replicated and used as a measure in applied and critical research, extending to methods of assessment and diverse theories of mental illness, development, and marketing (Wilson, 2016).

Yet is there really a mental representation of one's own self-esteem at an unconscious level of processing, a kind of self-knowledge about which we have no knowledge, no introspective access? The alternative mentalistic approach removes the unconscious representation system for theories of identity and self-knowledge, suggesting more parsimoniously that we have a set of conscious contents, over time, that determines our identity. They include a set of propositional contents with "I" and "me" as subject or predicate and sub-propositional contents such as a sense of "I" or "me." In the case of the Letter Preference Task, sub-propositional contents may come to awareness while judging preference for a name letter including "me" and "name." Often these content would be expected to produce associated propositional contents as well. For other preference judgments, a propositional content may be in awareness such as "This letter is mine/is in my name." Empirical evidence was therefore required to show letter ownership was the consciously controlling reason in awareness for preference ratings rather than unconscious self-esteem controlling the preference effect. Sampling participants from the United States and the United Kingdom, the hypothesis was that there is nothing explanatory about the theory of implicit self-esteem, at least as it is operationalized by the name-letter effect.

The study set out to replicate the standard NLE finding while carefully assessing awareness to identify and evaluate the nature of the mental representations that determine the effect. In the past the NLE was assumed unconscious from post-

experimental questioning and, more recently, from no awareness assessment at all (Wilson, 2016). In the evaluation study the analysis of awareness involved directly asking participants to report the reasons for their preference ratings for each letter of the alphabet. After rating random letters from the entire alphabet, English-speaking participants provided reasons for liking letters and then assigned those reasons to each letter. That is, participants simply reported their task-related motives for every judgment. A validity metric was then created of *how often the participants' conscious reason for preferring name-letters was their ownership of the letter.* Results demonstrated that individuals were surprisingly aware of their reasons for letter preferences and letter ownership was consistently the reason in awareness reported for name-letters, up to 84%. The awareness assessment made possible the quantification of report validity against the number of name-letters assigned to the ownership motive given. The validities of these conscious reports strongly predicted the NLE scores and left no evidence for mental representations of self-esteem at an unconscious implicit level. Not only do the findings call into question the operational adequacy of the NLE for applied personality research, the analytic technique for awareness assessment again proved effective for demonstrating participants were conscious of their reasons for preferring name-letters and the symbolic mental representations that predicted name-letter effect scores were conscious ones.

Conclusions

A principle tenet of the standard dual-processing cognitive metatheory is the assumption of a separate unconscious mental representation system the operations and influences of which are outside of conscious awareness (e.g., Mealor et al., 2014). An alternative "mentalistic" cognitive metatheory eliminates an explanatory unconscious and considers all forms of cognition to be conscious mental episodes of two types (Dulany, 1991; 2003). They may be deliberative mental events on propositional contents or associative cognitions in which sub-propositional contents are evoked. Three studies were summarized that investigated learning to control a dynamic system, social attitudes toward the environment, and self-knowledge, each with the intention to demonstrate awareness of implicit cognitions and the predictability of that awareness for measures of the construct. The findings in each case demonstrated that task-related knowledge in awareness predicted experimental performance. In each case, too, the uncovered contents in awareness must call into doubt the adequacy of the implicit test for that domain.

The analytic method of consciousness assessment common to these diverse studies achieved access to valid contents in awareness that the standard view predicts should be unconscious. Of course, any study has its limitations and the present findings certainly require replication. Advocates of dual-processing may detract by suggesting the conscious contents that participants reported in these studies were only emergents, or ad hoc surmising from memory, and certainly not controlling of behavior. Such criticism it seems will have to provide a corresponding explanation for the predictability of the conscious reports as well. Others in favor of a cognitive unconscious in some form may argue that there is still a theoretical role to play by implicit cognition, but such approaches will have to adequately assess awareness in the process. In the present studies the analysis involved the specification of knowledge related to the particular task that should be in awareness at the time of performance, the creation of a report (correct computer inputs, IAT trial difficulty,

and letter ownership respectively) that constrained responses to the specific conscious contents, the quantification of report validity against the knowledge required for the task demands at the time, and the predictive analysis of report validities and task performance.

Is an unconscious mental system a necessary postulate of human cognitive functioning? For the examined psychological domains presented here it appears to not be so. Might we learn more about consciousness using more thorough, analytic approaches to its scientific assessment? The repeated method summarized here appears promising. The analytic posture toward conscious report demonstrated a means of achieving introspective access to contents in awareness and quantifying them for analysis. With refinement, the general technique may be found effective for research in other domains such as self-awareness research (e.g., Stein et al., 2016) or clinical practice (Grecco et al., 2013). The analysis was driven by an alternative mentalistic view of human cognition that suggests wherever unconscious mental representation is claimed in psychological theory there are conscious contents to be uncovered that control the behavior. As psychological scientists continue investigating the powers of conscious identity and self-awareness, and develop new methods of mindfulness practice, the time has come to gather empirical evidence to makes the traditional notion of a powerful unconscious mind obsolete.

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